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# Claims

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- A family of airfoils for a blade of a cooling-tower fan, wherein the blade has a root region and a tip region, the family of airfoils comprising an airfoil in the root region of the blade having a Reynolds number of 500,000, and an airfoil in the tip region of the blade having a Reynolds number of 1,000,000, and wherein each airfoil is characterized by a maximum lift coefficient that is largely insensitive to roughness effects.
- The family of airfoils of claim 1 wherein the airfoil in the tip region has a maximum 2. lift coefficient of 1.5, and the airfoil in the root region has a maximum lift coefficient of 1.5.
- 10 3. The family of airfoils of claim 2 wherein the blade is from 3 to 10 meters in length.
  - The family of airfoils of claim 2 wherein the tip-region airfoil has a thickness of about 4. 10% chord, and the root region airfoil has a thickness of about 14% chord.
  - An airfoil for a blade of a cooling-tower fan wherein the blade has a root region 5. airfoil having a cross-sectional shape characterized by a thickness of about 14% chord and a maximum lift coefficient of about 1.5 to be substantially insensitive to roughness, and a Reynolds number of 500,000.
  - 6. The root region airfoil of claim 5 wherein the blade is 3 to 10 meters in length.
  - 7. An airfoil for a blade of a cooling-tower fan wherein the blade has a root region airfoil comprises an upper surface and a lower surface and a blade chord line wherein x/c values are dimensionless locations along the blade chord line and the y/c values are dimensionless heights from the chord line to points on the upper or lower surface, wherein said values correspond substantially to the following table for said surfaces:

## UPPER SURFACE

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X/C y/c 25 1.00000 0.00000 0.99662 0.00114 0.98703 0.00476 0.97233 0.01078 0.95346 0.01852 30 0.93085 0,02701 0.90436 0.03546 0.87375 0.04370 0.83919 0.05188 0.80116 0.05998 35 0.76012 0.06785

0.71657 0.07535

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0.67101 0.08232 0.62395 0.08859 0.57590 0.09397 0.52735 0.09831 0.47876 0.10147 0.43059 0.10333 0.38330 0.10381 0.33728 0.10284 0.29293 0.10039 10 0.25059 0.09648 0.21061 0.09119 0.17330 0.08462 0.13897 0.07691 0.10792 0.06822 15 0.08040 0.05875 0.05665 0.04869 0.03685 0.03828 0.02116 0.02780 0.00968 0.01758 20 0.00256 0.00808 0.00019 0.00179

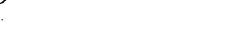
### LOWER SURFACE

x/c y/c 25 0.00000 -0.00004 0.00021 -0.00165 0.00093 -0.00316 0.00215 -0.00470 0.00374 -0.00627 30 0.01354 -0.01266 0.02846 -0.01889 0.04821 -0.02465 0.07252 -0.02979 0.10113 -0.03414 35 0.13371 -0.03759 0.16991 -0.04003 0.20931 -0.04131 0.25153 -0.04120 0.29632 -0.03951 40 0.34354 -0.03619 0.39294 -0.03140

0.44418 -0.02524 0.49710 -0.01784 0.55160 -0.00978

0.60714 -0.00186 0.66285 0.00525 0.71775 0.01102

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0.77079 0.01508 0.82084 0.01719 0.86679 0.01718 0.90735 0.01506 5 0.94113 0.01136 0.96729 0.00713 0.98565 0.00340 0.99645 0.00088 1.00000 0.00000

- 10 8. An airfoil for a blade of a cooling-tower fan wherein the blade has a tip region airfoil having a cross-sectional shape characterized by a thickness of about 10% chord and a maximum lift coefficient of about 1.5 to be substantially insensitive to roughness, and an Reynolds number of 1,000,000.
  - 9. The tip region airfoil of claim 5 wherein the blade is 3 to 10 meters in length.
- 10. An airfoil for a blade of a cooling-tower fan wherein the blade has a tip region airfoil comprises an upper surface and a lower surface and a blade chord line wherein x/c values are dimensionless locations along the blade chord line and the y/c values are dimensionless heights from the chord line to points on the upper or lower surface, wherein said values correspond substantially to the following table for said surfaces:

# 20 UPPER SURFACE

x/c y/c 1.00000 0.00000 0.99670 0.00088 0.98716 0.00373 25 0.97222 0.00863 0.95269 0.01521 0.92905 0.02278 0.90137 0.03076 0.86962 0.03901 30 0.83410 0.04761 0.79539 0.05651 0.75405 0.06552 0.71067 0.07440 0.66582 0.08287 35 0.62009 0.09058 0.57397 0.09708 0.52766 0.10192 0.48128 0.10496 0.43504 0.10625

> 0.38928 0.10586 0.34435 0.10391 0.30064 0.10051

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0.25854 0.09581 0.21849 0.08997 0.18089 0.08313 0.14614 0.07541 5 0.11457 0.06695 0.08648 0.05789 0.06211 0.04839 0.04163 0.03863 0.02516 0.02886 10 0.01280 0.01937 0.00455 0.01054 0.00047 0.00297 0.00003 0.00066

#### 15 LOWER SURFACE

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x/c y/c 0.00004 -0.00070 0.00037 -0.00179 0.00120 -0.00266 0.00254 -0.00346 0.00771 -0.00536 0.02065 -0.00762 0.03926 -0.00898 0.06332 -0.00945 0.09261 -0.00909 0.12682 -0.00800

> 0.16562 -0.00627 0.20860 -0.00402

0.25530 -0.00138 30 0.30519 0.00152 0.35772 0.00455 0.41227 0.00755 0.46821 0.01041 0.52486 0.01296 35 0.58152 0.01510

0.63745 0.01667 0.69190 0.01759 0.74412 0.01779 0.79336 0.01725

0.83888 0.01593 40 0.87997 0.01390 0.91590 0.01120 0.94594 0.00809 0.96955 0.00501

45 0.98647 0.00240 0.99662 0.00063 1.00000 0.00000